

We claim:

1. A large aperture retro-reflector defining a clear aperture, said retro-reflector comprising:
  - A) a housing,
  - B) a compound lens attached to said housing, said lens defining a focal surface represented by a locus of focal points for beams of light illuminating said retro-reflector from a range of directions of at least +/- 20 degrees,
  - C) a mirror element having a reflective surface co-located with or approximately co-located with said focal surface.
2. The retro-reflector as in Claim 1 wherein at least 75 percent of light in a predetermined wavelength range illuminating said aperture of said retro-reflector from a light source, approximating a point source, within said range of direction is reflected back toward said light source with a divergence of less than +/- 1.0 degrees.
3. The retro-reflector as in Claim 1 wherein at least 90 percent of light in a predetermined wavelength range illuminating said aperture of said retro-reflector from a light source, approximating a point source, within said range of direction is reflected back toward said light source with a divergence of less than +/- 0.001 degrees.
4. The retro-reflector as in Claim 1 and also comprising a modulator positioned so as to modulate light beams from an interrogating light source located at an interrogation location and a modulating means for modulating said modulator to impose communication signals on said interrogating beam to permit communication from said retro-reflector back to the interrogation location.
5. The retro-reflector as in Claim 4 wherein said modulator is a quantum well modulator.
6. The retro-reflector as in Claim 4 wherein said clear aperture defines a diameter and said lens defines a diameter and the diameter of the clear aperture is at least 1/3 the lens diameter.
7. The retro-reflector as in Claim 1 and also comprising a modulator positioned so as to modulate light beams from an interrogating light source located at an

- interrogation location and a modulating means for modulating said modulator to impose communication signals on said interrogating beam to permit communication from said retro-reflector back to the interrogation location.
8. The retro-reflector as in Claim 7 wherein said modulator is a quantum well modulator.
  9. The retro-reflector as in Claim 3 wherein said clear aperture defines a diameter and said lens defines a diameter and the diameter of the clear aperture is at least 1/3 the lens diameter.
  10. The retro-reflector as in Claim 4 wherein said lens defines a focal surface represented by a locus of focal points for beams of light illuminating said retro-reflector from a range of directions of at least +/- 60 degrees.
  11. The retro-reflector as in Claim 4 wherein said modulator is positioned between said lens and said mirror element and is movable with respect to the lens and the mirror element and further comprising:
    - A) a tracking device for tracking a source of interrogating light beams at an interrogating location,
    - B) a modulator position control means for positioning said modulator across an interrogating light beam from said source, and
    - C) a modulating means for modulating said modulator to impose signals on said interrogating beam to permit communication from said retro-reflector back to the interrogation location.
  11. An array of retro-reflectors each retro-reflector defining a clear aperture, and each of said retro-reflectors comprising:
    - A) a housing,
    - B) a compound lens attached to said housing, said lens defining a focal surface represented by a locus of focal points for beams of light illuminating said retro-reflector from a range of directions of at least +/- 20 degrees,
    - C) a mirror element having a reflective surface co-located with or approximately co-located with said focal surface,
    - D) a modulator positioned so as to modulate light beams from an interrogating light source located at an interrogation location and a modulating means for

modulating said modulator to impose communication signals on said interrogating beam to permit communication from said retro-reflector back to the interrogation location.

12. The array of retro-reflectors as in Claim 11 wherein all but one of said retro-reflectors are tilted with respect to one un-tilted retro-reflector.